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Intra-Relations of African Canaries, Genus *Serinus*

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In preparing the section of African canaries for a forthcoming volume of *Peter's Check-List of Birds of the World*, I found a welcome guide in White's 1963 *Revised Check-List of African Flycatchers. . . Finches . . . and Waxbills*. However, I have made some changes in the arrangement of the species, and a few in species and subspecies limits.

Before going on to detail, the list of 25 species is presented with, where appropriate, the more aberrant subspecies included. Some of the latter have been considered, and perhaps will prove to be separate allopatric species. The 25 species recognized are arranged into six groups to indicate relationships and to aid discussion.

AFRICAN *SERINUS*

GROUP I

1. *canicollis* (including *flavivertex*)
2. *nigriceps*

GROUP II

3. *citrinelloides*
4. *frontalis*
5. *capistratus*
6. *koliensis*
7. *scotops*

GROUP III

8. *leucopygius*
9. *atroregularis* (includes *reichenowi*, *xanthopygius*, and *rothschildi*; *flavigula* is considered a mutant)

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10. *citrinipectus* (of hybrid *atrogularis* × *mozambicus* origin)
11. *mozambicus*
12. *donaldsoni*
13. *flaviventris* (includes *maculicollis* and *dorsostriatus*)
14. *sulphuratus*
15. *albogularis*

GROUP IV

16. *gularis* (includes *reichardi*)
17. *mennelli*
18. *tristriatus*
19. *menachensis*

GROUP V

20. *striolatus* (includes *whyti*)
21. *burtoni* (includes *melanochrous*)
22. *rufobrunneus*
23. *leucopterus*

GROUP VI

24. *totta* (includes *symonsi*)
25. *alaris* (includes *leucolaema*)

This list is not the only arrangement possible, but is a compromise. Notably, Group II might have been placed first, Group V might have preceded Group IV. But, this is an attempt to put first the forms most like the Eurasian *Chloris*-*Serinus*-*Carduelis*-*Spinus* group, from which the African forms presumably originated, and place last, the most different African species without obvious close relatives elsewhere.

In making this arrangement, like White, I found it impractical to use the four genera in which Sclater (1930, *Systema Avium Ethiopiarum*) grouped them:

1. *Spinus* for the birds with wedge-shaped, fine-pointed bills (vs. stubby or heavy bills with curved culmen):
nigriceps, *frontalis*, *citrinelloides* and *totta*.
- b. *Serinus* for the predominantly yellow-green species:
mozambicus, *sulphuratus*, etc.
- c. *Poliospiza* for the predominantly grey-brown species:
tristriatus, *atrogularis*, *gularis*, *burtoni*, *albogularis*, etc.
- d. *Alaris* for the one black, chestnut and white species:
alaris.

The other proposed genera, including the eight genera or subgenera proposed since 1920, are not recognized.

Certain lines of evident species relationship cut across that indicated by the unit characters used by Selater. General similarities in plumage and pattern seemed the most useful in arranging the species. In regard to distribution, it must be remembered that almost all are non-forest birds in Africa, and thus range patterns exclude for the most part the tropical rain forests of the Congo and West Africa.

The six groups and their species are discussed below. The generalized range is given for each species.

GROUP I

1. *canicollis*—Eastern Africa: Eritrea to Cape Province; west to Angola.
2. *nigriceps*—Northeast Africa: (Ethiopia) above 8,000 feet.

Both are predominantly yellow-green species with rump only slightly yellower than back; *canicollis* (including *flavivertex*) is a rather plain species with a stubby bill; head pattern restricted to a dark area through eye and a yellowish forecrown; the female is duller, plain below; but the immature is more brownish above, whitish below and quite heavily streaked, both above and below. It appears to be distantly related to *S. canarius* and *S. serinus*. The conspicuous geographical variation includes: grey on back and sides of neck in the South African *S. c. canicollis*, lacking in other races; and tail being yellow or black: six subspecies.

S. nigriceps is also a green-yellow bird, but with a black "hood" (i.e., head and neck) in the male. It has a rather more slender bill than *caniceps* and slightly larger tarsus and toes and has been put in *Spinus*. No subspecies. While those two species are not particularly closely related, they seem as close to the Eurasian members of *Serinus*-*Spinus* group as to any of the African members, and thus are placed first.

GROUP II

3. *citrinelloides*—Eastern Africa: Eritrea to Kenya, eastern Northern Rhodesia and northern Portuguese East Africa (3 subspecies).
4. *frontalis*—Eastern Africa: Uganda and adjacent Congo, to northeastern Northern Rhodesia (? and subspecies Angola?)
5. *capistratus*—Gabun to Angola and south and east of the forests to north end of Lake Tanganyika.

6. *koliensis*—East Africa: eastern Congo to western Kenya.
7. *scotops*—South Africa.

These five species of small, yellow-green birds with rump a little yellower than the back, form a closely intra-related group despite the differences in bill shape and in sexual dimorphism. The bill is thinnest and most pointed in *frontalis*, and becomes progressively more stubby and heavier through *citrinelloides*, *capistratus*, *koliensis*, and *scotops*. Sexual dimorphism in color is pronounced in *frontalis*, *capistratus*, and some populations of *citrinelloides*, in all of which the males have a black mask (lacking in all females) and, correlated with this, are unstreaked below. The females of *citrinelloides* and *capistratus* are heavily streaked below, while that of *frontalis* is plain yellow. Sexual dimorphism in color is much less in *koliensis*, *scotops*, and some populations of *citrinelloides*, in which the black mask is reduced to dusky or greyish, or is absent, and both males and females are heavily streaked below.

Needless to say, the arrangement of these species has been various, *citrinelloides* and *frontalis* have been put in *Spinus* at times in the past, the others in *Serinus*. In recent treatments of the central African forms, *citrinelloides* and *frontalis* have been considered conspecific as have *capistratus* and *koliensis*, while Chapin (1954, Bull. Amer. Mus. Nat. Hist., 75B, pp. 606, 608) says that in eastern Congo where both *frontalis* and *capistratus* occur, but not together, their behavior is similar and if it were not for the differences in bill shape, he would consider them conspecific.

It is perhaps significant that the two most different central African forms, *frontalis* and *koliensis*, are the only ones with wide overlaps in ranges. What is found out about the manner in which *citrinelloides* meets *frontalis* and *koliensis* in western Kenya and eastern Uganda will probably influence our species concepts here. In the meantime, it seems advisable to keep them as species.

As in Group I, the relationship of this group to the *Serinus*-*Spinus* group of Eurasia seems evident, but cannot be pin-pointed.

GROUP III

8. *leucopygius*—northern Ethiopian region: Senegal to Eritrea.
9. *atrogularis*—Arabia, eastern and southern Africa: Eritrea to Cape Province and Angola.
10. *citrinipectus*—southern Portuguese East Africa area.
11. *mozambicus*—widespread outside forests in Ethiopian regions.

12. *donaldsoni*—northeastern and eastern Africa (Somalia to Tanganyika).
13. *flaviventris*—northeastern (Somalia), eastern and southern Africa and Angola.
14. *sulphuratus*—eastern Africa (Kenya) to South Africa (where chiefly eastern) and Angola.
15. *albugularis*—southern Africa, chiefly western.

In this group, the bill is of the stubby '*Serinus*' type, becoming very heavy in some species. Four species are predominantly yellow-green, while the remaining four others are predominantly grey-brown. The rump is differently colored, contrasting with the rest of the back, white in one species, yellow in the others; the "typical *Serinus*" head pattern (yellow or white forehead, and line over eye, a yellow or white fleck in cheek, a dark band through or back of the eye, and dark malar stripe) appears for the first time in this series and is usual, though is not invariably present even within a species (e.g., *atrogularis*).

These eight species form a fairly satisfactory group with stepped similarities, beginning with brown and grey, streaked species to various intermediate forms, to a species which is green-yellow in both sexes, and ending with a predominantly grey species.

S. leucopygius is a small grey-brown, streaked species with a white rump, completely lacking yellow or green. In part at least this is a geographical representative of the next species. *S. atrogularis*, also a small, grey-brown streaked species, has a yellow rump; the geographical variation in this species is great, and although the black-throated, eastern African form *somereni* is linked by intermediates to the very different white-throated, streaked *deserti* of South West Africa, the three northeastern forms, *reichenowi*, *xanthopygius*, and *rothschildi*, could, on present knowledge, be considered allopatric species. The close relationship of this species to the following yellow-green forms is also indicated by occasional occurrence of yellow-throated mutants in the northeastern forms of Africa, which White considered a separate species, *flavigula* (Rand, 1968, Bull. Brit. Ornith. Club, 88, p. 116), and by the fact that *citrinipectus* of southern Portuguese East Africa is a species that seems to be of hybrid *atrogularis-mozambicus* origin (Irwin, 1961, Durban Mus. Novit., 6, pt. 11, pp. 138-39).

S. mozambicus is small, greenish above, yellow below, with a "*Serinus* head pattern" of black and yellow, and with little sexual

dimorphism in color, though the female is duller. Even the young are similar but duller and with only a little spotting on breast.

The next species, *S. donaldsoni*, though much larger, and with a heavier bill, has a male that is somewhat of the yellow-green *S. mozambicus* type of coloration, with the head pattern more subdued, while the female is somewhat of the white-throated, streaked breast, brown-grey and whitish *S. atrogularis reichenowi* type!

S. flaviventris has a moderate bill and the male with the type of plumage that is similar to that of *donaldsoni* but more like that of *sulphuratus*. However, in the northern part of the range, the male has lower breast and abdomen white. The female has the upper parts brownish to olive green, streaked, and the under parts yellow and white, with breast more or less streaked. *S. flaviventris* as used here includes *dorsostriatus*.

S. flaviventris of South Africa, with six races, and *S. dorsostriatus* of East Africa, with two races, have usually been kept as separate species, with a wide geographical gap between their ranges. However, the differences between the two races that most closely approach each other is less than those characterizing some geographically isolated subspecies in such species as *atrogularis*, *striolatus*, *burtoni*, and *totta*.

The characters of the relevant races are:

S. f. damarensis; southern Angola and South West Africa to extreme northwestern Southern Rhodesia. (For revision of South African forms see White, 1967, Bull. Brit. Ornith. Club, **87**, p. 111 and references therein.) Male, wing (3) 70-75 (av. 71.1); tail (3) 53-55 (av. 54); culmen 9-10 mm.

S. f. dorsostriatus; northwest Tanganyika, southwestern Kenya, and central eastern Uganda: male like *damarensis* but upper parts greener with black streaking heavier, yellow of forehead wider; abdomen with a small patch of white, often obscured by surrounding yellow feathers; bill averages shorter. Male, wing (7) 72-77 (av. 73.4); tail (7) 47-52 (av. 50.7); culmen 8-10 mm. Female like that of *damarensis* in having conspicuous white abdomen and yellow breast more or less streaked, and differs chiefly in duller more olive upper parts with broader blackish streakings.

S. f. maculicollis; Somaliland to eastern Kenya and west to south-eastern Sudan and northeastern Uganda. Male like that of *dorsostriatus* but yellow band on forehead much narrower, and whole abdomen conspicuously white; wing (9) 67-74 (av. 69.7); tail (9) 47-51 (av. 48.6); culmen 8-10 mm. Female: much like that of *dorso-*

striatus but white of abdomen more extensive, extending onto lower breast; streaking on breast more restricted sometimes forming a necklace across the yellow lower throat-upper breast.

The most extreme of the yellow-green series is *S. sulphuratus*, an intensely colored species with both male and female green and lightly streaked above, green-yellow below, unstreaked, and with the "typical *Serinus*" head pattern present but rather obscure, and even the immature are yellow-green, unstreaked below. The subspecies to be recognized have been discussed separately (Rand, 1968, *Fieldiana: Zool.*, 51, no. 8).

The change to the predominantly grey and white *S. albogularis* seems a sudden one, but in reality is not so great. *S. albogularis* looks in size, bill, and color much like *S. sulphuratus* that has lost all the yellow-green pigmentation except that on the rump and upper tail coverts.

GROUP IV

16. *gularis*—north Ethiopian region, northeastern and eastern Africa south to South Africa and Angola.
17. *mennelli*—Angola to Portuguese East Africa.
18. *tristriatus*—northeastern Africa: Eritrea to Ethiopia.
19. *menachensis*—southwestern Arabia.

In this group of brown-grey birds (without yellow or green), the rump is like the back in color; the side of the head is uniformly brown or blackish, except for a white eyebrow stripe in three species, and a black malar stripe in one, *tristriatus*. The crown tends to be more heavily streaked than the back due to the paler edges of the feathers which in several species are white and so extensive in the forecrown as to suggest an incipient white forehead. The throat tends to be white, and streaking of the breast and flanks none, to obscure or moderate. The bill is more or less stubby *Serinus* type but with a tendency for slight elongation and slight slenderness.

This group seems a fairly close-knit one. Perhaps the closest relative of the first species, *gularis*, is with *albogularis* to which it has a vague similarity; at the other extreme, *menachensis* seems to have no other relatives outside this group.

S. gularis has a white throat, brownish face, white eyebrow stripe, much white in forecrown, and in some subspecies there is moderate streaking on breast, flanks and back. Geographical variation is considerable, and the question of the specific status of *reichardi*, the

browner, more streaked bird of parts of eastern Africa, has been raised. Very close to *gularis* is *mennelli*, which co-exists with *gularis* and differs only in detail of coloration (black vs. brown face, etc.). *S. tristriatus* is a very plain bird with little streaking even on crown. The small area of white on chin and upper throat is bordered by black malar stripe, and the white eye stripe is narrow, but sharply defined. The Arabian representative, *menachensis*, is still plainer, but more streaked above and below.

GROUP V

20. *striolatus*—eastern Africa (Eritrea to Nyasaland).
21. *burtoni*—mountains of central Africa, Mt. Cameroon, Mt. Kenya, etc.
22. *rufobrunneus*—islands in Gulf of Guinea.
23. *leucopterus*—mountains of southwestern Cape Province.

This is a group of medium size to large, predominantly brown and grey canaries with moderate to heavy bills. Three species (in part at least) of the four have some tinge of greenish-yellow. The rump is colored like the back. The typical canary head pattern is present in one species (in brown and whitish), and suggested in another. Although not as closely knit a group as the three preceding ones, the limitations of a lineal arrangement justify grouping them here.

The only species with a widespread range is *striolatus*, which is heavily streaked above and on breast and flanks, and a pronounced "canary head pattern." It recalls a giant *S. atrogularis reichenowi* of eastern Africa, but it has greenish edgings to the wing quills, and one subspecies of restricted range, *S. s. whytii*, has yellow in throat and head, indicating the relationships with the yellow-green series. This last could be considered a separate species of restricted range in the highlands of southern Tanganyika and northern Nyasaland.

The relationship of the above species to the next, *burtoni*, of restricted, fragmented range, is indicated by the race *S. b. melanochrous* of the highlands of southern Tanganyika, which on the upper parts and head is much like *burtoni* but on the under parts has the streaking of *striolatus* and could be kept as a separate species. Another unusual, though minor character, of *melanochrous* is that the white in the forehead is due to white feather edging, as in *gularis*, not more solid areas as in *burtoni*. *S. burtoni* is a large canary, heavy billed, upper parts nearly uniform brown, with whitish tips to wing coverts (some races); a variable amount of white markings in forehead and

sides of head, and black and white in chin, suggesting a canary head pattern that is nearly lost, as the green of the plumage also has nearly disappeared, being present only as edgings to wing quills. Except for the one distinctly streaked subspecies mentioned above, the breast, belly, and flanks are ochraceous brown, with a little obscure streaking.

The Gulf of Guinea islands endemic *S. rufobrunneus* is a very plain reddish brown, above and below, bird with obscure streakings or mottling, throat paler with some dark markings on chin, and greater and medium wing coverts with pale rufous tips. Presumably, this is the result of a later invasion by *burtoni*-stock, after an earlier one gave rise to the genus *Neospiza* of Saint Thomas Island.

The South African species of limited distribution, *S. leucopterus*, a large, heavy-billed canary, is a rather plain, grey-brown, obscurely-mottled bird with white throat and abdomen and with the greenish influence appearing as a greenish tinge over back and wings. It could also be considered a relative of *albogularis*, or, more probably perhaps, of *gularis*. However, I put it here, agreeing with Clancey (1963, Durban Mus. Novit., 6, pt. 19, p. 262).

GROUP VI

24. *totta*—South Africa.
25. *alario*—South Africa.

These two small species are not closely related, but are grouped as being the most extreme of the genus, without obvious specific relationships elsewhere in the genus. *S. totta* has been put in the genus *Spinus* because of the wedge-shaped bill. Even Roberts (1922, Ann. Transvaal Museum, 8, p. 261) in coining so many new subgeneric names did not change this one. The pattern of obscurely mottled rufous-brown mantle, yellow-green striped head (without canary type pattern), and plain yellow, or yellow and rufous under parts, and the white line on the inner web of the outer tail feathers, is without parallel in the genus, though the contrasting yellow-green rump, of one race but not the others, is *Serinus* in character. In one race the female differs from the male only in degree; in the other, it is mostly rufous brown above, paler brown below. Although two rather different subspecies are recognized, this is an arbitrary decision, and some would consider them as two species.

S. alario (including *leucolaema* as a subspecies) with a stubby bill has had a genus proposed for it, because of its coloration, but Roberts (1922, Ann. Transvaal Museum, 8, p. 261) wrote that he thought it

not far removed from *S. atrogularis*. Nicolai (1959, Zool. Jahr. bücher., Syst., pp. 317-361) on the basis of behavior and hybridization relates it to *S. serinus* and *canicollis*. However, the coloration of the male with black hood, rufous mantle, and white lower breast and abdomen, and the female being drab-grey-brown and pale chestnut, and the similar but duller young with streaked upper parts provide little in the way of clues to relationships.

SUMMARY

This paper does not include the non-African species of the *Carduelis-Serinus-Spinus* group from which the African forms presumably evolved. The arrangement, new here, is based on similarities in patterns and is presumably phyletic. One genus, instead of several which have sometimes been used in the past, has been used for the above 25 species. A comprehensive species concept has also been used. Of the 25 species concerned, eight contain units which could be, and often have been, considered as separate species. These are indicated on the list on page 125. Only one of these is newly arranged here, the merging of *S. dorsostratus* in the species *S. flaviventris*. In only one case is a traditional species treated as representing two species, i.e., *Serinus frontalis* and *S. citrinelloides*. These represent a group meriting further study.

The question of subspecies to be recognized have been extensively reviewed in the voluminous literature of African birds, of which the major items will be cited in the forthcoming volume of "Peters." The subjective element in the number of subspecies to be recognized makes a definitive treatment impossible.

At times it seems that the South African species have a disproportionate number of subspecies. But it must be remembered that the landscape there is very complex, with diversified vegetation and climate. Numbers of local workers, with large series and familiar with the birds in life, have reviewed the races, not always, it must be admitted, with the same results. I have had to make decisions. In only one case, *S. sulphuratus*, have I resurrected a name for a long overlooked race.